

CERTIFICATION

SDG No: JC19423 Laboratory: Accutest, New Jersey
 Site: BMS, Building 5 Area, PR Matrix: Soil/Groundwater
 Humacao, PR

SUMMARY: Groundwater and soil samples (Table 1) were collected on the BMSMC facility – Building 5 Area. The BMSMC facility is located in Humacao, PR. Samples were taken April 28, 2016 and were analyzed in Accutest Laboratory of Dayton, New Jersey for low molecular weight alcohols (LMWA):- isopropyl alcohol and sec-butyl alcohol. The results were reported under SDG No.: JC19423. Results were validated using "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846 (Final Update III, December 1996)," specifically for Methods 8000/8015C are utilized and the latest validation guidelines (July, 2015) of the EPA Hazardous Waste Support Section. The analyses performed are shown in Table 1. Individual data review worksheets are enclosed for each target analyte group. The data sample organic data samples summary form shows for analytes results that were qualified.

In summary the results are valid and can be used for decision taking purposes.

Table 1. Samples analyzed and analysis performed

SAMPLE ID	SAMPLE DESCRIPTION	MATRIX	ANALYSIS PERFORMED
JC19423-1R	MW-20S (7-8)	Soil	LMWA:- ISOPROPYL ALCOHOL AND SEC-BUTYL ALCOHOL
JC19423-2R	RA-18 GWD	Groundwater	LMWA:- ISOPROPYL ALCOHOL AND SEC-BUTYL ALCOHOL
JC19423-2RD	RA-18 GWD MSD	Groundwater	LMWA:- ISOPROPYL ALCOHOL AND SEC-BUTYL ALCOHOL
JC19423-2RS	RA-18 GWD MS	Groundwater	LMWA:- ISOPROPYL ALCOHOL AND SEC-BUTYL ALCOHOL

Reviewer Name: Rafael Infante
 Chemist License 1888

Signature:

Date:

Rafael Infante

June 7, 2016



SGS Accutest

Report of Analysis

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Client Sample ID: MW-20S (7-8)
 Lab Sample ID: JC19423-1R
 Matrix: SO - Soil
 Method: SW846-8015C (DAI)
 Project: BMSMC, Building 5 Area, PR

Date Sampled: 04/28/16
 Date Received: 05/02/16
 Percent Solids: 74.3

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 ^a	GH105139.D	1	05/20/16	XPL	n/a	n/a	GGH5293
Run #2							

	Initial Weight
Run #1	5.0 g
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
67-63-0	Isopropyl Alcohol	ND	130	77	ug/kg	
78-92-2	sec-Butyl Alcohol	ND	130	72	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
111-27-3	Hexanol	109%		52-141%
111-27-3	Hexanol	111%		52-141%

(a) Sample analyzed outside the holding time per client's request.



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest

Report of Analysis

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Client Sample ID:	RA18-GWD	Date Sampled:	04/28/16
Lab Sample ID:	JC19423-2R	Date Received:	05/02/16
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	SW846-8015C (DAI)		
Project:	BMSMC, Building 5 Area, PR		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 ^a	GH105181.D	1	05/24/16	XPL	n/a	n/a	GGH5297
Run #2							

CAS No.	Compound	Result	RL	MDL	Units	Q
67-63-0	Isopropyl Alcohol	ND	100	68	ug/l	
78-92-2	sec-Butyl Alcohol	ND	100	66	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
111-27-3	Hexanol	90%		56-145%
111-27-3	Hexanol	89%		56-145%

(a) Sample analyzed outside the holding time per client's request.



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Matrix Spike/Matrix Spike Duplicate Summary

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Job Number: JC19423R

Account: AMANYWP Anderson, Mulholland & Associates

Project: BMSMC, Building 5 Area, PR

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
JC19423-2RMS	GH105182.D	1	05/24/16	XPL	n/a	n/a	GGH5297
JC19423-2RMSD	GH105183.D	1	05/24/16	XPL	n/a	n/a	GGH5297
JC19423-2R *	GH105181.D	1	05/24/16	XPL	n/a	n/a	GGH5297

The QC reported here applies to the following samples:

Method: SW846-8015C (DAI)

JC19423-2R

CAS No.	Compound	JC19423-2R Spike ug/l	Q	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-63-0	Isopropyl Alcohol	ND		5000	99	5000	5480	110	10	70-133/28
78-92-2	sec-Butyl Alcohol	ND		5000	99	5000	5490	110	10	64-136/25

CAS No.	Surrogate Recoveries	MS	MSD	JC19423-2R Limits
111-27-3	Hexanol	92%	103%	90% 56-145%
111-27-3	Hexanol	98%	107%	89% 56-145%

(a) Sample analyzed outside the holding time per client's request.



* = Outside of Control Limits.

50-4047
GW

CHAIN OF CUSTODY

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ACCUTEST-NY

SGS Acculox - Dayton
2235 Route 130, Dayton, NJ 08810
TEL: 732-329-0500 FAX: 732-329-3499/3180
www.acculox.com

801219536018

Testing Drive Controls

TC19423

[illegible]

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JC19423R: Chain of Custody

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EXECUTIVE NARRATIVE

SDG No: **JC19423R** Laboratory: **Accutest, New Jersey**
Analysis: **SW846-8015C** Number of Samples: **4**
Location: **BMSMC, Building 5 Area**
Humacao, PR

SUMMARY: Four (4) samples were analyzed for selected low molecular weight alcohols (LMWAs):- isopropyl alcohol and sec-butyl alcohols, following method SW846-8015C. The sample results were assessed according to USEPA data validation guidance documents in the following order of precedence: "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846 (Final Update III, December 1996)," specifically for Methods 8000/8015C are utilized. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

Results are valid and can be used for decision making purposes.

Critical issues: **None**
Major: **None**
Minor: **None**

Critical findings: **None**
Major findings: **1. Sample analyzed outside the holding time per client's request. Results are qualified in affected samples: non-detects results are rejected (R).**
Minor findings: **None**

COMMENTS: Results are valid and can be used for decision making purposes.

Reviewers Name: **Rafael Infante**
Chemist License 1888

Signature:



Date:

June 7, 2016

SAMPLE ORGANIC DATA SAMPLE SUMMARY

Sample ID: JC19423-1R

Sample location: BMSMC Building 5 Area

Sampling date: 4/28/2016

Matrix: Soil

METHOD: 8015C

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Isopropyl Alcohol	130	ug/kg	1.0	-	R	Yes
sec-Butyl Alcohol	130	ug/kg	1.0	-	R	Yes

Sample ID: JC19423-2R

Sample location: BMSMC Building 5 Area

Sampling date: 4/28/2016

Matrix: Groundwater

METHOD: 8015C

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Isopropyl Alcohol	100	ug/l	1.0	-	R	Yes
sec-Butyl Alcohol	100	ug/l	1.0	-	R	Yes

Sample ID: JC19423-2R MS

Sample location: BMSMC Building 5 Area

Sampling date: 4/28/2016

Matrix: Groundwater

METHOD: 8015C

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Isopropyl Alcohol	4940	ug/l	1.0	-	-	Yes
sec-Butyl Alcohol	4960	ug/l	1.0	-	-	Yes

Sample ID: JC19423-2R MSD

Sample location: BMSMC Building 5 Area

Sampling date: 4/28/2016

Matrix: Groundwater

METHOD: 8015C

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Isopropyl Alcohol	5480	ug/l	1.0	-	-	Yes
sec-Butyl Alcohol	5490	ug/l	1.0	-	-	Yes

DATA REVIEW WORKSHEETS

Project Number: JC19423R
 Date: 04/28/2016
 Shipping Date: 04/28/2016
 EPA Region: 2

REVIEW OF VOLATILE ORGANIC PACKAGE

The following guidelines for evaluating volatile organics were created to delineate required validation actions. This document will assist the reviewer in using professional judgment to make more informed decision and in better serving the needs of the data users. The sample results were assessed according to USEPA data validation guidance documents in the following order of precedence: "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846 (Final Update III, December 1423R)," specifically for Methods 8000/8015C are utilized. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

The hardcopied (laboratory name) Accutest data package received has been reviewed and the quality control and performance data summarized. The modified data review for VOCs included:

Lab. Project/SDG No.: JC19423R Sample matrix: Soil/Groundwater
 No. of Samples: 4

Trip blank No.: -
 Field blank No.: -
 Equipment blank No.: -
 Field duplicate No.: -

<input checked="" type="checkbox"/> Data Completeness	<input checked="" type="checkbox"/> Laboratory Control Spikes
<input checked="" type="checkbox"/> Holding Times	<input checked="" type="checkbox"/> Field Duplicates
<input type="checkbox"/> N/A GC/MS Tuning	<input checked="" type="checkbox"/> Calibrations
<input type="checkbox"/> N/A Internal Standard Performance	<input checked="" type="checkbox"/> Compound Identifications
<input checked="" type="checkbox"/> Blanks	<input checked="" type="checkbox"/> Compound Quantitation
<input checked="" type="checkbox"/> Surrogate Recoveries	<input checked="" type="checkbox"/> Quantitation Limits
<input checked="" type="checkbox"/> Matrix Spike/Matrix Spike Duplicate	

Overall Comments: Selected_low_molecular_weight_alcohols_by_SW-846_8015C

Definition of Qualifiers:

J- Estimated results
 U- Compound not detected
 R- Rejected data
 UJ- Estimated non-detect

Reviewer: Rafael Infante
 Date: Junio 7, 2016

DATA REVIEW WORKSHEETS

All criteria were met _____
 Criteria were not met _____
 and/or see below X

HOLDING TIMES

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE ANALYZED	pH	ACTION
Samples analyzed outside the holding time per client request. All samples properly preserved; < 10°C.				
JC19423-1R	04/28/16	05/20/16	-	Sample results qualified: positive results are qualified estimated (J); non-detects are rejected (R).
JC19423-2R	04/28/16	05/24/16	< 2	
JC19423-2R MS	04/28/16	05/24/16	< 2	
JC19423-2R MSD	04/28/16	05/24/16	< 2	

Criteria

Aqueous samples – 14 days from sample collection for preserved samples (pH ≤ 2, 4°C), no air bubbles.

Aqueous samples – 7 days from sample collection for unpreserved samples, 4°C, no air bubbles.

Soil samples- 7 days from sample collection.

Cooler temperature (Criteria: 4 ± 2 °C): 9.8°C

Actions

If the VOCs vial(s) have air bubbles, estimate positive results (J) and reject nondetects (R).

If the % solids of soil samples is 10-50%, estimate positive results (J) and nondetects (UJ)

If the % solid of soil samples is < 10%, estimate positive results (J) and reject nondetects (R).

If holding times are exceeded but < 14 days beyond criteria, estimate positive results (J) and nondetects (UJ).

If holding times are exceeded but < 28 days beyond criteria, estimate positive results (J) and reject nondetects (R).

If holding times are grossly exceeded (> 28 days beyond criteria), reject all results (R).

If samples were not iced or if the ice were melted (> 10°C), estimate positive results (J) and nondetects (UJ).

you're not

All criteria were met NA

GC/MS TUNING

The assessment of the tuning results is to determine if the sample instrumentation is within the standard tuning QC limits

N/A The BFB performance results were reviewed and found to be within the specified criteria.

__N/A__ BFB tuning was performed for every 12 hours of sample analysis.

If no, use professional judgment to determine whether the associated data should be accepted, qualified or rejected.

List the samples affected: _____

If mass calibration is in error, all associated data are rejected.

DATA REVIEW WORKSHEETS

All criteria were met X
Criteria were not met
and/or see below _____

V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

Laboratory blanks

DATE ANALYZED	LAB ID	LEVEL/MATRIX	COMPOUND	CONCENTRATION UNITS
		All_method_blank_meeth_method_specific_criteria		

Field/Equipment/Trip blank

[illegible]

DATA REVIEW WORKSHEETS

All criteria were met X
 Criteria were not met
 and/or see below

V B. BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

Action Levels (ALs) should be based upon the highest concentration of contaminant determined in any blank. Do not qualify any blank with another blank. The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. No positive sample results should be reported unless the concentration of the compound in the samples exceeds the ALs:

ALs = 10x the amount of common contaminants (methylene chloride, acetone, 2-butanone, and toluene)

ALs = 5x for any other compounds

Specific actions are as follows:

If the concentration is $<$ sample quantitation limit (SQL) and \leq AL, report the compound as not detected (U) at the SQL.

If the concentration is \geq SQL but \leq AL, report the compound as not detected (U) at the reported concentration.

If the concentration is \geq SQL and $>$ AL, report the concentration unqualified.

Notes:

High and low level blanks must be treated separately

Compounds qualified "U" for blank contamination are still considered "hits" when qualifying for calibration criteria.

CONTAMINATION SOURCE/LEVEL	COMPOUND	CONC/UNITS	AL/UNITS	SQL	AFFECTED SAMPLES

DATA REVIEW WORKSHEETS

All criteria were met ☒ X
 Criteria were not met
 and/or see below _____

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.

List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery.

Matrix: solid/aqueous

SAMPLE ID	SURROGATE COMPOUND				ACTION
	Hexanol	DBFM	TOL-d8	BFB	

____ All surrogate recoveries within laboratory control limits. _____

QC Limits* (Aqueous)

____ LL to UL ____ 73 to 123 ____ to ____ to ____ to ____

QC Limits* (Solid-Low)

____ LL to UL ____ 52 to 141 ____ to ____ to ____ to ____

QC Limits* (Solid-Med)

____ LL to UL ____ to ____ to ____ to ____ to ____

1,2-DCA = 1,2-Dichloromethane-d4

TOL-d8 = Toluene-d8

DBFM = Dibromofluoromethane

BFB = Bromofluorobenzene

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.

* If QC limits are not available, use limits of 80 – 120 % for aqueous and 70 – 130 % for solid samples.

Actions:

QUALITY	%R < 10%	%R = 10% - LL	%R > UL
Positive results	J	J	J
Nondetects results	R	UJ	Accept

Surrogate action should be applied:

If one or more surrogate in the VOC fraction is out of specification, but has a recovery of > 10%.

If any one surrogate in a fraction shows < 10 % recovery.

DATA REVIEW WORKSHEETS

All criteria were met X
 Criteria were not met
 and/or see below _____

VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples. If any % R in the MS or MSD falls outside the designated range, the reviewer should determine if there are matrix effects, i.e. LCS data are within the QC limits but MS/MSD data are outside QC limit.

1. MS/MSD Recoveries and Precision Criteria

The laboratory should use one MS and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If target analytes are not expected, MS/MSD should be analyzed.

List the %Rs, RPD of the compounds which do not meet the criteria.

Sample ID: JC20528-1AMS/-MSD Matrix/Level: Soil
 Sample ID: JC19423-2RMS/-MSD Matrix/Level: Aqueous

MS OR MSD	COMPOUND	% R	RPD	QC LIMITS	ACTION
<u>_MS/MSD_%_recoveries_and_RPD_within_laboratory_control_limits</u>					

- * QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
- * If QC limits are not available, use limits of 70 – 130 %.

Actions:

QUALITY	%R < LL	%R > UL
Positive results	J	J
Nondetects results	R	Accept

MS/MSD criteria apply only to the unspiked sample, its dilutions, and the associated MS/MSD samples:

If the % R for the affected compounds were < LL (or 70 %), qualify positive results (J) and nondetects (JJ).

If the % R for the affected compounds were > UL (or 130 %), only qualify positive results (J).

If 25 % or more of all MS/MSD %R were < LL (or 70 %) or if two or more MS/MSD %Rs were < 10%, qualify all positive results (J) and reject nondetects (R).

DATA REVIEW WORKSHEETS

All criteria were met X
 Criteria were not met
 and/or see below

VII. B MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MS/MSD – Unspiked Compounds

It should be noted that Region 2 SOP HW-24 does not specify a MS/MSD criteria for the unspiked compounds in the sample. A %RSD of < 50% has therefore been utilized as professional judgment.

If all target analytes were spiked in the MS/MSD, this review element is not applicable.

List the %RSD of the compounds which do not meet the criteria.

Sample ID: - Matrix/Level/Unit: -

COMPOUND	SAMPLE CONC.	MS CONC.	MSD CONC.	% RSD	ACTION

Actions:

- * If the % RSD > 50, qualify the positive result in the unspiked samples as estimated (J).
- * If the % RSD is not calculated (NC) due to nondetected value, use professional judgment to qualify the data.

A separate worksheet should be used for each MS/MSD pair.

All criteria were met X
 Criteria were not met
 and/or see below

VIII. LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

Where LCS spiked with the same analyte at the same concentrations as the MS/MSD? **Yes**
 or No. If no make note in data review memo.

List the %R of compounds which do not meet the criteria

LCS ID	COMPOUND	% R	QC LIMIT
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Recoveries within laboratory control limits

- * QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
- * If QC limits are not available, use limits of 70 – 130 %.

Actions:

QUALITY	%R < LL	%R > UL
Positive results	J	J
Nondetects results	R	Accept

All analytes in the associated sample results are qualified for the following criteria.

If 25 % of the LCS recoveries were < LL (or 70 %), qualify all positive results (j) and reject nondetects (R).

If two or more LCS were below 10 %, qualify all positive results as (J) and reject nondetects (R).

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix? Yes or No.

If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected.

DATA REVIEW WORKSHEETS

All criteria were met ____ N/A ____
 Criteria were not met
 and/or see below ____

IX. FIELD/LABORATORY DUPLICATE PRECISION

Sample IDs: _____ - _____

Matrix: _____ - _____

Field/laboratory duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

The project QAPP should be reviewed for project-specific information.

Suggested criteria: RPD \pm 30% for aqueous samples, RPD \pm 50 % for solid samples. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION
No field/laboratory duplicate analyzed with this data package. MS/MSD recoveries RPD used to assess precision. RPD within laboratory and generally acceptable control limits.					

Actions:

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria. For organics, only the sample and duplicate will be qualified.

If an RPD cannot be calculated because one or both of the sample results is not detected, the following actions apply:

If one sample result is not detected and the other is greater than 5x the SQL qualify (J/UJ).

If one sample value is not detected and the other is greater than 5x the SQL and the SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is less than 5x, use professional judgment to determine if qualification is appropriate.

If both sample and duplicate results are not detected, no action is needed.

All criteria were met N/A
Criteria were not met
and/or see below _____

X. INTERNAL STANDARD PERFORMANCE

The assessment of the internal standard (IS) parameter is used to assist the data reviewer in determining the condition of the analytical instrumentation.

List the internal standard area of samples which do not meet the criteria.

- * Area of +100% or -50% of the IS area in the associated calibration standard.
- * Retention time (RT) within 30 seconds of the IS area in the associated calibration standard.

DATE	SAMPLE ID	IS OUT	IS AREA	ACCEPTABLE RANGE	ACTION
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Actions:

- 1. IS actions should be applied to the compound quantitated with the out-of-control ISs**

QUALITY	IS AREA < -25%	IS AREA = -25 % TO - 50%	IS AREA > + 100%
Positive results	J	J	J
Nondetected results	R	UJ	ACCEPT

2. If a IS retention time varies more than 30 seconds, the chromatographic profile for that sample must be examined to determine if any false positive or negative exists. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for the sample fraction.

DATA REVIEW WORKSHEETS

All criteria were met X
Criteria were not met
and/or see below _____

XII. SAMPLE QUANTITATION

The sample quantitation evaluation is to verify laboratory quantitation results. In the space below, please show a minimum of one sample calculation:

JC19423R-2RMS

sec-Butyl alcohol

RF = 25.63

$$[] = (123174)/(25.63)$$

$$= 4,806 \text{ ppm OK}$$

All criteria were met X
Criteria were not met
and/or see below _____

XII. QUANTITATION LIMITS

A. Dilution performed

[illegible]

B. Percent Solids

List samples which have $\leq 50\%$ solids

[illegible]

Actions:

If the % solids of a soil sample is 10-50%, estimate positive results (J) and nondetects (UJ)

If the % solids of a soil sample is $< 10\%$, estimate positive results (J) and reject nondetects (R)